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(56) Documents Cited
GB 2240618 A GB 1518791 A GB 1162221 A
GB 1155383 A GB 1115023 A WO 88/10057 A

(58) Field of Search
UK CL (Edition M) F4S S60A, H5H HAAX1 HAA7 HAA8 HAA9 HAK HAX2
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(54) Electric panel convector heater

(57) A panel heater comprises a heating element arranged against the rear face of a front panel. Air can flow within an internal area of the heater and over the heating element to provide a convective heating effect. Heat is also radiated from the front face of the front panel. The element comprises two resistive wires sandwiched between two sheets of high emmisivity, high electrical resistance insulation material. Both elements are activated when the heater is first switched on and a thermostat switches off power to one of the elements when a desired temperature is reached. A series of angulated slits is provided in the panels of the heater to allow circulation of the convected air. A series of the panel heater may be connected to a dedicated ring main and controlled by micro-processor.

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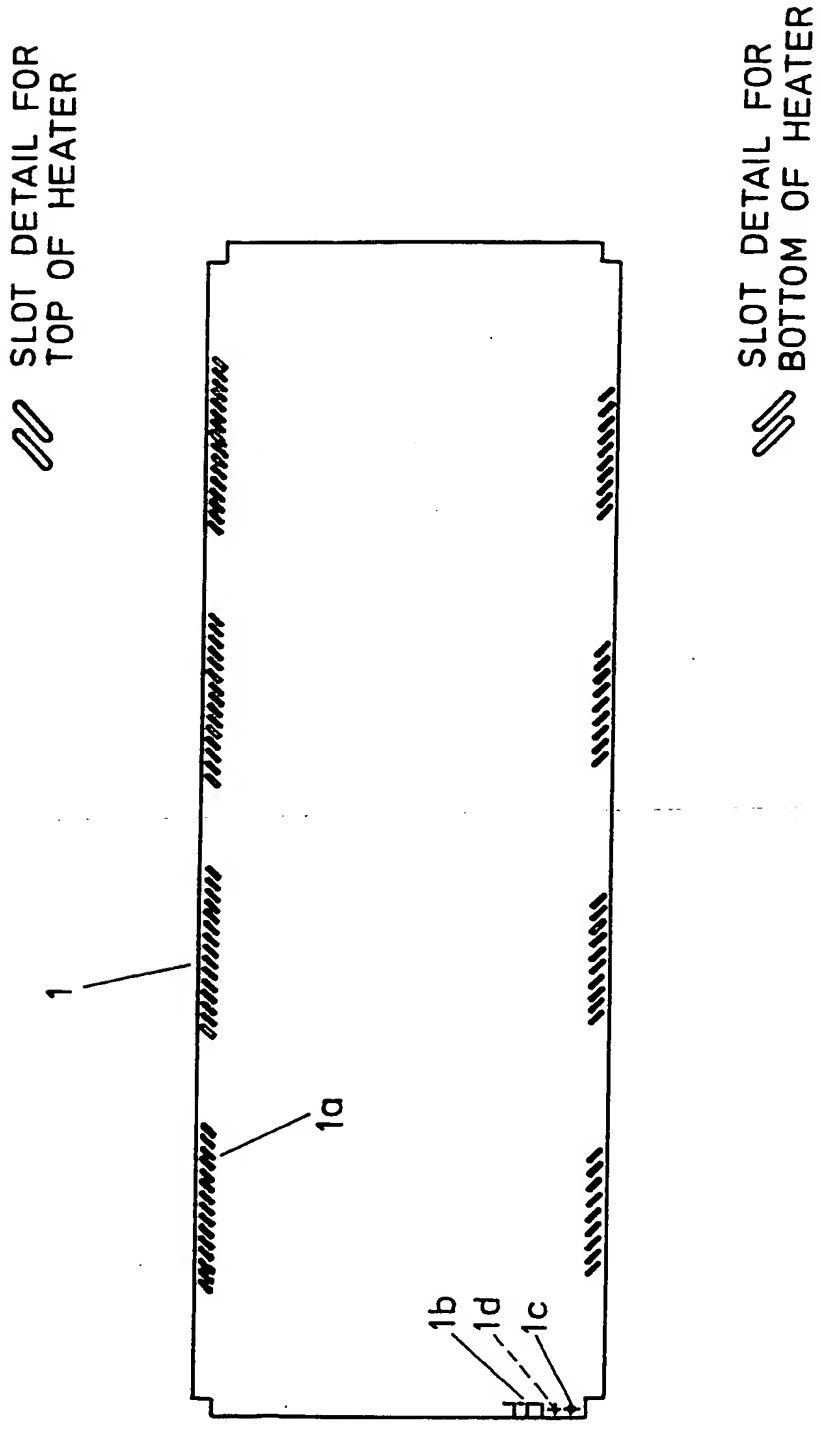
SLOT DETAIL FOR TOP OF HEATER
SLOT DETAIL FOR BOTTOM OF HEATER
1
1a
1b
1d
1c

FIG. 1

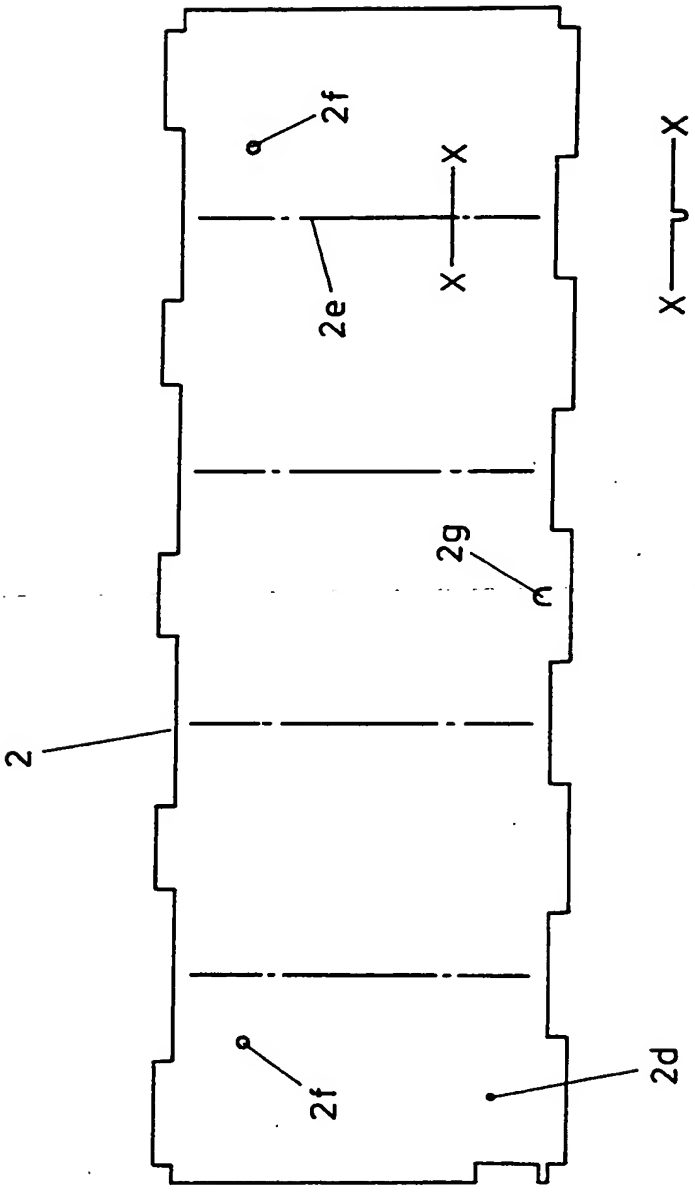

FIG. 2

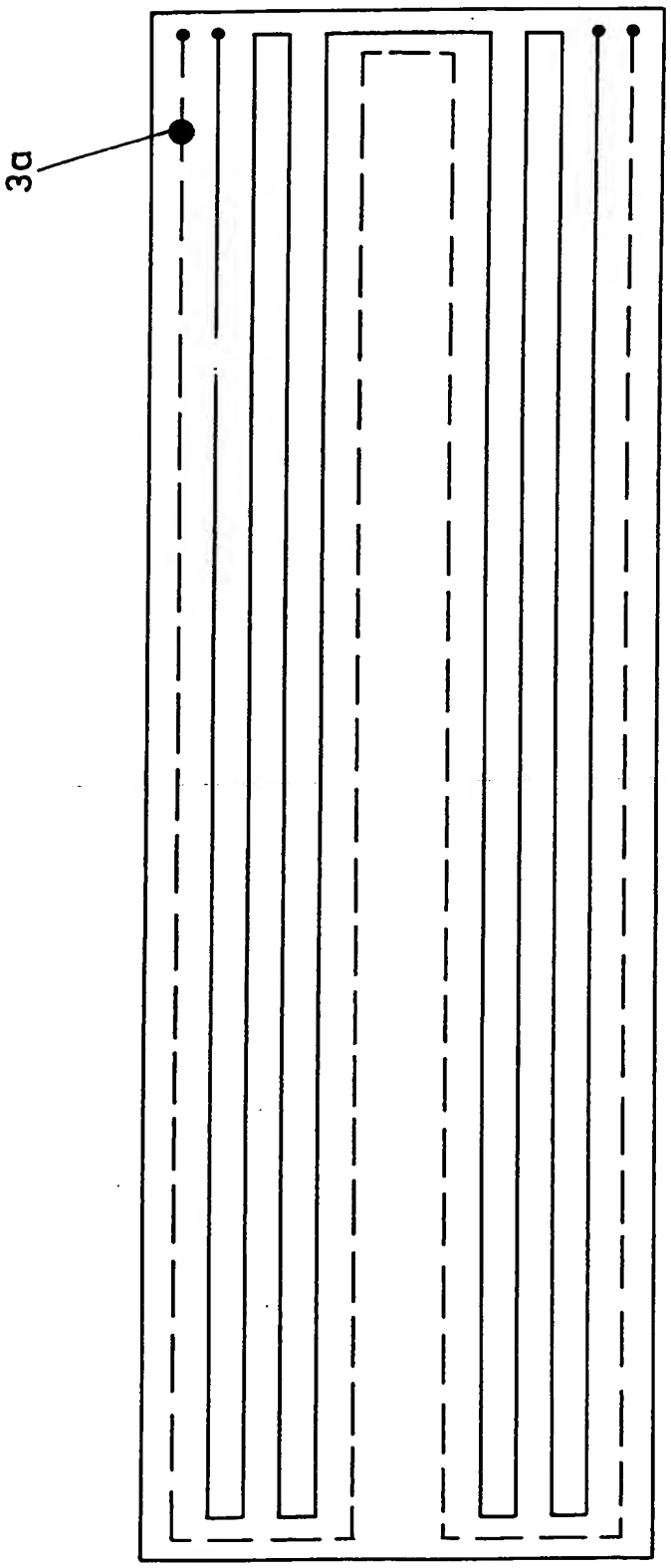

FIG. 3

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DESCRIPTION OF THE INVENTION

The invention relates to the development of a totally new concept in electrical convector radiator panels.

Mankind considers heating to be a basic need for survival, different groups in society need differing levels of sustainable heat at affordable prices, to be able to survive and have a certain comfort level. This comfort level is seen as being a minimum of 16°C 61F but the new Building Regulations 1991, introduced in April, 1993, go further and specify far higher temperatures. Zone (1) sleeping areas 18°C 65F Zone (2) residential areas 21°C (70F) these figures are supported by the Department of the Enviroment and Home Energy Rating Scheme, which has been brought into being to ensure Councils conform to requirements to provide adequate affordable heating to tenants.

Some 85% of all properties in the U.K. including new build do not conform to these strandards and 45% of all houses have no format of proper heating and are generally occupied by the elderly, infirm, one parent families, those most in need of adequate heating, but who cannot afford the high fuel costs.

This later category also suffer from condensation problems, which cause structural damage and in certain cases, as identified in reports from the B.M.A. serious medical conditions to the occupants.

The primary reason for inadequate heating conditions being the affordability of a system, this is not only the running costrs but the initial outlay for a system.

The Government is fully cognisant of the situation and this coupled to the requirements of all signatories to the Rio Accord Agreement for the reduction of CO2 emmissions to reduce the Green House effect ensures that in all aspect, particularly domestic and industrial energy requirements, the cleanest cheapest fuel source should be used.

The diminishing fossil fuels and the restricted availability of gas and oils esnures that the fuel of the future will be electricity, particularly atomic and solar power.

It is with the above in mind that the invention has come into being.

There are three basic sizes of panels, but for the purposes of this application all drawings and indications relate to the 1000 watt intermediary heater.

The outer casing of the panels Drawing (1-2) shows metal sheeting having been stamped and pressed into regular shapes Front (1) Back panel (2). The top edge of the front panel having a series of angulated slits (1a) these are to allow convected heat to pass out from the internal area of the panel into the room area. The bottom edge of the ~~rear~~ front panel (1) has a similar arrangement of angulated slits, smaller in number than those at (1a) so arranged as to restrict and control the inflow of cold air which passes over the heated element, this is necessary to maintain an exact flow of air at any given time, if too much cold air was allowed to inflow, it would not reach the required temperature and there would be an inbalance in the relationship, percentage wise, of convected and radiated heat emmission.

Item (1b) on the front panel is a rectangular hole into which a two pole illuminated switch is fitted and connected to the element and mains supply which enetr the front panel through a circular hole item (1c) Both front and rear panels have circular holes item (d) to facilitate a twin earth connection.

Items (2e) on the rear panels are spotted welded ridges, so positioned as hold the element to the rear face of the front panel. Front and rear panels are riveted together as required by BS 3456.

Items (2f) in the rear panel are eye holes to be used as fixing and location points when the heater panels are wall mounted. Item (2g) on the bottom of the rear panel is a pull down tab, used as a final securing point.

The element Drawing (3) is a two stage resistive wire element, whereby a section of high performance resistive wire is sandwiched between two sheets of high emmesivety, high electrical resistence insulation material. The insulation material are laminated with a high temperature two way adhesive material, to which is affixed the resistive wire, the second laminated insulated sheet is then bonded to the first sheet,. firmly securing the resistive wire in position, the sheets as one unit are then pressure rolled.

The element consist of a larger and smaller wattage resistive wire as shown Larger (- - -) smaller (——) on drawing No (3) the total wattage of the two elements being a maximum of 1000 watts. When the heater panel is switched ON, both elements are activated and heat up the panel to its maximum working temperature of 80°C in under four (4) minutes, at which time the bi metal thermostat Item (3a) opens and cuts off the larger element.

The panel acting as a heat cinque retains the built up heat for a considerable period, assisted in this by the smaller element having remained on, only when the internal area of the heater panel drops to 70°C does the bi metal thermostat (3a) close allowing the power to flow into the larger element and build the heat back up to 80°C, when again its cuts off, this is repeated continuously..

In this manner the heater develops a power demand of peaks and troughs, whereby the smaller element (——) constantly demands a lower amount of power shown as line (———) on drawing (4) which peaks when the larger element(- - - -) shown as line (- - - - - -) is activated. In this manner the heater remains in the temperature band 70°C to 80°C the whole time, but the power required to maintain these temperatures is reduced to 50% of the rated capacity of the heater eg 1000watts rated/500 watts demanded.

This has the direct result that the fuel costs are drastically reduced to 50% of what would normally be expected.

A series of panels can, on a dedicated ring main be installed as full house heating, see drawing No: (5a) the different zones being controlled by thermostats item (5a) and timing controls item (5b) including microprocessor control unit item (5c) by these methods further savings would be evidenced through having more controllability.

CLAIMS FOR INVENTION

1. The invention is new and offers the consumer distinct advantages over all other types of electrical heating appliances.

2. The two stage element configuration as shown in Drawing (3) ensures the element heats up to the full working temperature of 80°C in under four minutes.

3. The configuration of element shown in drawing (3) shows an outer element of resistive wire (large wattage element) and an inner element of resistive wire (small element) a bi metal thermostat (a) on drawing (3) is affixed to the larger element and cuts off the power supply to the element wire when the full working temperature has been reached, leaving only the smaller element to maintain and support the initially built up heat. In this manner the heaters achieve high working temperatures, which are maintained for long periods on a low power input, this results in energy savings in the region of 50% and a drastic reduction in fuel charges.

4. By having generated sustainable high heat output by low energy input, considerable savings of raw fossilised fuels will be achieved.

5. By operating on low energy input from electricity, reductions in the emmissions of CO2 will take place, assisting in reducing the Green House effect.

6. The panels are $\frac{3}{4}$" in width and when fitted to walls, fit in line with skirting boards and do not reduce the area of the room into which they are fitted.

7. The insulation materials used in the element are unique to the invention and have an ultra high emmessivety factor along with an exceptionally high electrical insulation value, which ensures that the heat which has been quickly generated in the element passes out through the front panel efficiently and, the heat created on the rear of the panel is equaly to the heat going through the front panel, which is transmitted as convected heat, so that the panels give out convected and radiated heat in equal proportions.

8. No heat loss through the back panel occurs, so no heating of external thermal mass takes place, this results in further savings of fuel costs.

9. The panels can be integrated into a full Central Heating System on a dedicated ring main complete with zoned thermostats and timers see drawing (5) this type of system can be fitted into any property in a fraction of the time normally associated with this type of opertion, without resorting to structural alterations.

10. Fitted as individual panels condesnation and primary heating can be speedily and and cheaply achieved.

11. Fitting and removal of panels takes minutes.

Amendments to the claims have been filed as follows

1. An electrical heating appliance including a front panel and a rear panel between which an internal area of the appliance is defined, wherein a heating element is held against the rear face of the front panel and air can flow within the internal area over the heating element, whereby the appliance is arranged to produce both convected and radiated heat.

2. An appliance according to Claim 1, wherein the heating element includes a resistive element arranged to produce heat when activated.

3. An appliance according to Claim 1 or Claim 2, wherein the heating element comprises a resistive wire.

4. An appliance according to any preceding claim, wherein the heating element comprises a larger wattage resistive wire and a smaller wattage resistive wire.

5. An appliance according to any preceding claim, including a thermostat to control the power supplied to the larger resistive wire.

6. An appliance according to Claim 5, wherein the thermostat is fixed to the larger resistive wire.

7. An appliance according to Claim 5 or Claim 6, wherein the thermostat is a bi-metal thermostat.

8. An appliance according to any of Claims 2 to 7, wherein the resistive element is sandwiched between two sheets of material.

9. Apparatus according to Claim 8, wherein the sheets have a high electrical insulation factor.

10. An appliance according to Claim 8 or Claim 9, wherein the sheets are of high emissivity.

11. An appliance according to any of Claims 8 to 10, wherein the two sheets of material are bonded to one another, with the resistive element therebetween.

12. An electrical heating appliance substantially as hereinbefore described with reference to the accompanying diagrammatic drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

8

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Relevant Technical Fields

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(ii) Int Cl (Ed.5) F24H (3/00); H05B (3/16, 3/18, 3/24, 3/20, 3/28, 3/30)

Search Examiner
T M JAMES

Date of completion of Search
7 JULY 1994

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
1-11

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2240618 A	(THERMAFLEX) see Figures 1 and 2	1-11
X	GB 1518791	(DRG) see page 2 lines 9-31	1-11
X	GB 1162221	(DREAMLAND) see the Figure	1-11
X	GB 1155383	(THEMISER) see page 3 lines 3-19	1-11
X	GB 1115023	(M H GODDEN) see Figure 2 and page 2 lines 17-21	1-11
X	WO 88/10057	(SEAR) see page 4 lines 1-16	1-11

Databases:The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).